

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

**NOTICE OF ENTRY OF  
JUDGMENT ACCOMPANIED BY OPINION**

OPINION FILED AND JUDGMENT ENTERED: 05/18/04

The attached opinion announcing the judgment of the court in your case was filed and judgment was entered on the date indicated above. The mandate will be issued in due course.

Information is also provided about petitions for rehearing and suggestions for rehearing en banc. The questions and answers are those frequently asked and answered by the Clerk's Office.

No costs were taxed in this appeal.

Regarding exhibits and visual aids: Your attention is directed to FRAP 34(g) which states that the clerk may destroy or dispose of the exhibits if counsel does not reclaim them within a reasonable time after the clerk gives notice to remove them. (The clerk deems a reasonable time to be 15 days from the date the final mandate is issued.)

JAN HORBALY  
Clerk

cc: ROSS B. BRICKER  
ALEXANDER C. JOHNSON, JR.

EDWARDS SYSTEMS V DIGITAL CONTROL, 03-1116 , -1166, -1419  
DCT - 00-1365

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## United States Court of Appeals for the Federal Circuit

03-1116, -1166, -1419

EDWARDS SYSTEMS TECHNOLOGY, INC.,

Plaintiff-Appellant,

v.

DIGITAL CONTROL SYSTEMS, INC.

Defendant-Cross Appellant.

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DECIDED: May 18, 2004

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Before NEWMAN, Circuit Judge, ARCHER, Senior Circuit Judge, and PROST, Circuit Judge.

ARCHER, Senior Circuit Judge.

Edwards Systems Technology, Inc. ("Edwards") appeals the United States District Court for the District of Oregon's grant of summary judgment of noninfringement of United States Pat. No. 5,163,332 ("the '332 patent"). Edward Sys. Tech., Inc. v. Digital Control Sys., Inc., Civ. No. 00-1365-AS (D. Or. Sep. 24, 2002) (Order Adopting Findings and Recommendation of Magistrate Judge Ashmanskas and Granting Motion for Partial Summary Judgment). We hold that the district court erred in its claim construction. In view of the correct claim construction, we affirm-in-part and vacate-in-part the grant of summary judgment of noninfringement and remand the case for further proceedings. With respect to Digital Control, Inc.'s ("Digital Control") cross-appeal, we

also vacate the district court's denial of its motion for attorney fees and dismissal of its counterclaims.

The '332 patent is drawn to a device for measuring very low concentrations of environmental gases, such as carbon dioxide, through the use of radiation absorption. The gas analyzer of the '332 patent has a diffusion-type chamber which permits the gas to be tested (such as air) to diffuse into and out of the sample chamber through a number of openings ("apertures") in the chamber wall by means of ambient pressure, thereby eliminating the need for a pump or similar mechanism to force gas into the sample chamber. The openings in the chamber wall are covered by a filter ("semipermeable membrane") that allows molecules of gas to diffuse into and out of the chamber while excluding small airborne particles that may interfere with the operation of the device.

The '332 patent has one independent claim and 5 dependent claims. Claim 1 recites

1. A diffusion-type gas sample chamber for transmitting radiation through gases present in the chamber only by ambient pressure diffusion through a plurality of filtering apertures formed in the chamber walls, comprising in combination:
  - a) an elongated hollow tube composed of a gastight material and having a specularly-reflective surface on its inner walls for transmitting radiation introduced at one end of said tube to the other end of said tube by means of multiple reflections from said specularly-reflective surface;
  - b) said tube including a plurality of filtering apertures arrayed along said tube for improving the diffusion into and out of the space within said tube; and,
  - c) a sheet of a semipermeable membrane covering each of said plurality of filtering apertures, said semipermeable membrane permitting gases to diffuse through it under ambient pressure into and out of the space within said tube and preventing airborne particles larger than a predetermined size from entering said space.

'332 Patent, col. 6, ll. 1- 22 (claim terms at issue emphasized). Claim 4, which is not at issue per se, recites "said predetermined size is 0.1 micron." Id. at col. 6, ll. 29-30.

Digital Control manufactures carbon dioxide sensors. The models at issue here are the M310 and M301A. Both devices include a sample chamber which transmits radiation from one end of the chamber to the other through a gas sample that enters the chamber by diffusing through a number of filtering apertures. The M301A has two gas ports ("apertures"), diametrically opposed, near the radiation source, and a foam sleeve, approximately 5000 microns thick, covering the chamber end containing the gas ports. There are two allegedly infringing versions of the M310 device: one has a single gas port near each end, disposed on opposite sides of the chamber, and the second has two gas ports near one end (on opposite sides directly across from each other) and a single gas port on the opposite end. In the M310 models, the gas ports are covered with 3M Vent Tape 394, an adhesive-backed non-woven pressed-fiber material.

Edwards filed suit in United States District Court for the District of Oregon, alleging Digital Control infringed the '332 patent. The matter was referred to a magistrate judge for pre-trial proceedings. The magistrate judge issued a report containing a recommended claim construction and a recommended disposition of the parties' summary judgment motions. Edwards Sys. Tech. v. Digital Control Sys., Inc., Civ. No. 00-1365-AS (D. Or. Mar. 12, 2002) (Findings and Recommendation). The relevant terms were construed as follows: "specularly reflective surface" as "a surface that will transmit radiation down the length of the tube by means of multiple reflections from such surface," id. at 9; "plurality of apertures arrayed along" as requiring "a sample chamber with a minimum of two apertures located somewhere along the surface of the

sample chamber," id. at 15; and "semipermeable membrane" as a "semipermeable membrane[ ] which deflect[s] particles larger than 0.1 micron . . . [and is] a thin, soft, pliable membrane with a thickness on the order of 25 to 50 microns thick," id. at 19, 21. The magistrate judge found that the Vent Tape on the M310 device was not a semi-permeable membrane as required by the claim and found that the M310 device did not literally infringe the '332 patent. Id. at 27. Additionally, the magistrate judge concluded that the Vent Tape was not equivalent, either in purpose or performance, to the semipermeable membrane described in the patent. Id. at 29. Therefore, he held that the M310 device did not infringe the '332 patent under the doctrine of equivalents. Id. With respect to the M301A device, the magistrate judge found that it did not infringe the patent because the radiation source in that device was introduced through a hole in the side of the chamber near the end of the chamber, not at one end of the tube. Id. at 23. The magistrate judge does not appear to have made any determinations as to whether the M301A device infringed under the doctrine of equivalents. Finally, the magistrate judge recommended dismissing as moot Digital Control's motions for partial summary judgment of invalidity and enforceability. Id. at 30. The district court adopted the magistrate's findings and recommendations in their entirety and entered final judgment. As the prevailing party, Digital Control moved for attorney fees under 35 U.S.C. § 285. Because the magistrate judge found the case to be not "exceptional," he recommended denying this motion. The district court adopted the magistrate judge's finding and denied Digital Control's motion for attorney fees.

Edwards appeals the district court's claim construction and noninfringement findings, and Digital Control cross-appeals the dismissal of its counter-claims for

invalidity and unenforceability and the district court's denial of its motion for attorney fees. We have jurisdiction pursuant to 28 U.S.C. § 1295.

## II

We review the district court's grant of summary judgment without deference. Inverness Med. Switz. GmbH v. Warner Lambert Co., 309 F.3d 1373, 1377 (Fed. Cir. 2002). We view the evidence in a light most favorable to the non-movant and draw all reasonable inferences in its favor. Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 255 (1986). A motion for summary judgment is properly granted if there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law. Fed. R. Civ. P. 56(c).

An infringement analysis requires two steps: claim construction to determine the scope and meaning of the asserted claims and a comparison of the properly construed claims with the allegedly infringing device or method to determine whether the device or method embodies every limitation of the claims. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1454 (Fed. Cir. 1998) (*en banc*). Claim construction is a matter of law over which we exercise independent review. *Id.* at 1456. Whether an accused device or method infringes a claim either literally or under the doctrine of equivalents is a question of fact. Tanabe Seiyaku Co. v. United States Int'l Trade Comm'n, 109 F.3d 726, 731 (Fed. Cir. 1997). Thus, on appeal from a grant of summary judgment of noninfringement, we must determine whether, after resolving reasonable factual inferences in favor of the patentee, the district court correctly concluded that no reasonable jury could find infringement. IMS Tech., Inc. v. Haas Automation, Inc., 206 F.3d 1422, 1429 (Fed. Cir. 2000).

Whether a case is "exceptional" is a factual determination reviewed for clear error. Phonometrics, Inc. v. Westin Hotel Co., 350 F.3d 1242, 1246 (Fed. Cir. 2003). If the district court applied the correct legal standard and did not clearly err in its factual findings in making its determination that a case is exceptional, we then review the court's decision whether or not to award attorneys fees under an abuse of discretion standard. Sulzer Textil A.G. v. Picanol N.V., Nos. 02-1410, 02-1441, slip op. at 5 (Fed. Cir. 2004).

## A

In conducting claim construction, we first "look to the words of the claims themselves, both asserted and nonasserted, to define the scope of the patented invention." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996) (citing Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 620 (Fed. Cir. 1995)). "[W]ords of ordinary usage must nonetheless be construed in the context of the patent documents. Thus the court must determine how a person of experience in the field of this invention would, upon reading the patent documents, understand the words used to define the invention." Toro Co. v. White Consol. Indus., Inc., 199 F.3d 1295, 1299 (Fed. Cir. 1999). "Although words in a claim are generally given their ordinary and customary meaning, a patentee may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning, as long as the special definition of the term is clearly stated in the patent specification or file history." Vitronics Corp., 90 F.3d at 1582. Accordingly, we must also always review the specification to determine whether the inventor has used any terms "in a manner inconsistent with their ordinary meaning," id., which could result in a disavowal of claim

scope, see Teleflex, Inc. v. Ficosa N.Am. Corp., 299 F.3d 1313, 1324 (Fed. Cir. 2002). We must also look to the prosecution history to determine if the patentee has limited the scope of the claims by disclaiming a particular interpretation during prosecution. Biodex Corp. v. Loredan Biomed, Inc., 946 F.2d 850, 862 (Fed. Cir. 1991).

The claim limitations at issue on appeal are "semipermeable membrane"; "specularly reflective surface"; and "plurality of apertures arrayed along."<sup>1</sup>

#### *Semipermeable Membrane*

Claim 1 requires the gas sample chamber include "a sheet of a semipermeable membrane covering each of said plurality of filtering apertures, said semipermeable membrane permitting gases to diffuse through it under ambient pressure into and out of the space within said tube and preventing airborne particles larger than a predetermined size from entering said space." '332 Patent, col. 6, ll. 15-21. The district court interpreted this limitation to be "limited to [a] semipermeable membrane[ ] which deflect[s] particles larger than 0.1 micron" and which "is properly described as a thin, soft pliable membrane with a thickness on the order of 25 to 50 microns thick." Finding and Recommendation, slip op. at 19, 21. Thus, the court found two numerical limitations on the semipermeable membrane: 1) the "predetermined size" of the , particles prevented from entering the tube had to be 0.1 micron; and 2) the thickness of the membrane had to be "on the order of 25 to 50 microns."

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<sup>1</sup> Neither party asserts the M310 device does not meet the limitation "radiation introduced at one end of said tube." Further, because we hold that the M301A device does not infringe the '332 patent as a matter of law on other grounds, we need not address that limitation in either our claim construction or our infringement analysis.

We turn first to the "predetermined size" limitation. Edwards asserts the court improperly limited the claim term "predetermined size" to "particles larger than 0.1 micron," arguing that such a construction violates fundamental principles of claim construction and the doctrine of claim differentiation. Specifically, Edwards contends that the term "predetermined size," on its face, is broader than any one numerical limitation and that the specification and prosecution history provide no basis for a specific numerical limitation. Further, Edwards argues that because dependent claim 4 recites "said predetermined size is 0.1 micron," '332 Patent, col. 6, ll. 29-30, "0.1 micron" cannot be synonymous with the "predetermined size" language of claim 1 under the doctrine of claim differentiation. Edwards also asserts that the original application, the substitute specification, and the prosecution history do not support the court's narrowing of the claim limitation.

In response, Digital Control points out that the application as filed contained no mention of the phrase "predetermined size" and argues that the phrase "predetermined size" in the substitute specification must find support in the original disclosure if the claim is to be valid. Digital Control contends that the only way this occurs is if the phrase is read to mean 0.1 micron, because that is all the original application supports. Digital Control also contends that in the prosecution history of the '332 patent 0.1 micron was relied on to distinguish the semipermeable membrane from that of the prior art. Therefore, semipermeable membrane should be limited to a membrane that screens out particles greater than 0.1 micron.

When interpreting the phrase "predetermined size" of the particles screened out by the semipermeable membrane, we first look to the ordinary meaning of the words.

The phrase "predetermined size" is clearly broader on its face than any one numerical limitation, whether it be 0.1 micron or any other.

We next turn to the specification -- or in this case, the specifications -- to determine whether "predetermined size" should be given another meaning. Here, the substitute specification was substituted for the original prior to examination. The phrase "predetermined size" does not appear in the original specification, and references to 0.1 micron as a numerical limitation do occur in the original specification. However, in explaining what has been "described" in the application, the detailed description does not mention a numerical limitation for the size of particles the semipermeable membrane must prevent from entering the chamber. Rather, the application simply states "[d]ust and smoke particles are kept out of the sample chamber by a sheet of semi-permeable membrane that spans apertures that extend through the tubular wall of the sample chamber." This description demonstrates that the purpose of the membrane is to keep dust and smoke particles out of the chamber. Thus, it teaches one of ordinary skill in the art that the membrane need only be of a porosity that keeps out dust and smoke particles. As such, the application as filed does not support limiting the invention to only screening out particles greater than 0.1 micron. Accordingly, the original specification would not limit "predetermined size" to 0.1 micron.<sup>2</sup>

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<sup>2</sup> This is further supported by the fact that the examiner did not issue a new matter rejection in response to the filing of the substitute specification. As such, the examiner did not view the addition of the broad phrase "predetermined size" in the specification to be outside the scope of the original specification. See TurboCar Div. Of Demag Delaval Turbomachinery Corp. v. Gen. Elec. Co., 264 F.3d 1111, 1118 (Fed. Cir. 2001) ("The fundamental inquiry is whether the material added by amendment was inherently contained in the original application.") (citations omitted). This lack of a new matter rejection "carries an especially weighty presumption of correctness." Brooktree Corp. v. Advanced Micro Devices, Inc., 977 F.2d 1555, 1574-75 (Fed. Cir. 1992).

We now turn to whether the substitute specification sheds any light on the construction of the claim term "predetermined size." We conclude that the substitute specification supports a construction of the claim term that does not place a numerical limitation on the particle size. For example, the specification states

A second objective of the diffusion type gas sample chamber is to restrict access of unwanted contaminants, by size, so that they will not cause error in the measurement of the concentration of a particular gas, while at the same time permitting molecules of particular gas [sic] to freely enter and leave the sample chamber by diffusion only, through one or more filtering apertures.

'332 patent, col. 3, II. 28-34. The substitute specification also contains the statement from the original specification: "[d]ust and smoke particles are kept out of the sample chamber by a sheet of semi-permeable membrane that spans apertures that extend through the tubular wall of the sample chamber." This demonstrates that the substitute specification supports a construction of "semipermeable membrane" that does not place a numerical limitation on the particle size, even though the preferred embodiment of the invention suggests that the predetermined size be 0.1 micron. See Electro Med. Sys. v. Cooper Life Scis., Inc., 34 F.3d 1048, 1054 (Fed. Cir. 1994) (stating "claims are not to be interpreted by adding limitations appearing only in the specification" and "particular embodiments appearing in a specification will not be read into the claims when the claim language is broader than such embodiments").

Next, we look to the prosecution history of the '332 patent to determine whether "any interpretation . . . may have been disclaimed or disavowed during prosecution in order to obtain claim allowance." Intellectual Prop. Dev., Inc. v. UA-Columbia Cablevision of Westchester, Inc., 336 F.3d 1308, 1316 (Fed. Cir. 2003); see also

Inverness Med. Switz. GmbH, 309 F.3d at 1372 (statements made during prosecution were not a "clear and unambiguous" disclaimer of a claim scope). We hold that there was no such disclaimer or disavowal.

Two prior art references referred to in the prosecution history are relevant to this issue: Miyazaki and Fujimura. The Miyazaki reference discloses an infrared gas analyzer that comprises a sample cell and a reference cell, both of which have the form of a spiraled cylindrical tube to achieve a long optical path. Gas is forced into the sample cell through a gas inlet and exits through a gas outlet. The Fujimura reference is an air pollution detector unit which is designed to allow a car's air conditioning system to automatically switch between inside and outside air in response to a build-up of pollutants in the car. The device is characterized by a tube with two open ends in which air is forced by the movement of the vehicle into one end of the tube and exits through the other end of the tube. The concentration of pollutants in the air is measured by beaming light from an element in the side of the tube across the diameter of the tube and back again to the detectors located on each side of the light-emitting element. The intake end of the tube is covered by a dust filter which excludes relatively large airborne particles -- it being necessary to pass smaller dust particles through so that their concentration in the air can be measured.

In the First Office Action on the Merits, the examiner rejected claim 1 over Miyazaki in view of Fujimura, explaining that Miyazaki does not use a filter for the aperture, but Fujimura teaches a filter and it would have been obvious to use Fujimura's filter in Miyazaki's device in order to keep dust out of the sampling tube. In response, the applicant stated

Neither Miyazaki nor Fujimura teach or suggest "a sheet of semipermeable membrane" as recited in Claim 1. The dust filter 2 of Fujimura is for presenting [sic] the entry of particles much larger than 0.1 micron; otherwise it would screen out the very particles that, by scattering the light, are essential for the operation of the instrument.

While the applicant did refer to 0.1 micron as the size of particles entering the chamber, he simply explained how the "membranes" would not work the same. The filter in Fujimura needed larger particles to enter the chamber such that pollution levels could be measured. In the claimed invention, however, particles of the size of those Fujimura was designed to let in were to be kept out, as they could affect the device's readings. Thus, the applicant argued that the proposed Miyazaki-Fujimura combination would not work as the claimed invention was intended, because it would let in particles that were too large. Nothing in the inventor's statement suggests a "clear and unambiguous disclaimer" of all membranes that do not screen out particles down to 0.1 micron in size.

Finally, Edwards argues that the doctrine of claim differentiation suggests that the term "predetermined size" cannot be synonymous with the limitation "0.1 micron" in claim 4. The doctrine of claim differentiation presumes that separate claims do not have the same scope. Karlin Tech. Inc. v. Surgical Dynamics, Inc., 177 F.3d 968, 971-72 (Fed. Cir. 1999). The doctrine is particularly applicable in situations in which a claim limitation stated in general terms is asserted to be limited to a numerical range in the specification and the same numerical range appears in a dependent claim. Modine Mfg. Co. v. United States Int'l Trade Comm'n, 75 F.3d 1545, 1551 (Fed. Cir. 1996). In our analysis of the original and substitute specifications, it is apparent that "predetermined size" in claim 1 does not mean the same thing as 0.1 micron in claim 4.

Accordingly, the claim language itself, the specifications, the prosecution history, and the doctrine of claim differentiation all support a construction of the term semipermeable membrane in which “predetermined size” is not limited to 0.1 micron; rather, the limitation simply requires that the particles kept out of the chamber by the semipermeable membrane are of a predetermined size such as the size of dust and smoke particles.

As explained above, the district court also construed “semipermeable membrane” to contain an implicit thickness limitation: that it be a thin, soft pliable membrane with a thickness on the order of 25 to 50 microns.

Edwards argues that the court erred by importing the numerical range directly from the prior art discussion in the ‘332 patent’s written disclosure because these were merely general descriptive words in the background section of the patent. Edwards further asserts that there is nothing in the remaining portion of the specification or the prosecution history which suggests such a limitation was intended by the applicant.

Digital Control counters that both the specification and the prosecution history support the district court’s imposition of a thickness limitation. Specifically, Digital Control relies on the applicant’s statement during the prosecution of the ‘332 patent that “Burrough et al. [a prior art reference] make no use whatsoever of any semipermeable membrane.” The theory is that because the applicant explained in the specification that the membrane is to be of the order 25-50 microns and then further identified the thickness as a point of difference between his invention and Burrough et al., the applicant intended to limit the thickness of his membrane to 25-50 microns and took the

position that Burough et al.'s "several hundreds of microns thick" media was not a membrane.

Again, we start with the plain meaning of the claim terms. There is no suggestion in the specifications or the prosecution history that "semipermeable membrane" has anything other than its ordinary meaning. The term "semipermeable" means "[p]artially permeable" or "[a]llowing passage of certain, esp. small molecules or ions but barring others." The American Heritage College Dictionary 1240 (1997). "Membrane" is defined as "a thin soft pliable sheet or layer esp. of animal or vegetable origin," Webster's Third New International Dictionary 1408 (1986).

The substitute specification<sup>3</sup> explains that the semipermeable membrane must be "quite thin." '332 Patent, col. 2, ll. 63-64. The only mention of a suggested thickness of the semipermeable membrane occurs in the patent's discussion of the prior art. There the specification is comparing the claimed invention to the Burough et al. reference. Burough et al. discloses a device for measuring gas that includes a porous tube surrounding an enclosed column of air through which infrared radiation is beamed to measure its absorption by gas in the chamber. The specification explains that the porous material in Burough et al. is "several hundreds of microns thick," and contrasts that to the relatively thin semipermeable membrane of the claimed invention, which the specification says "is on the order of 25 to 50 microns thick." '332 Patent, col. 2, ll. 27-28.

Numerical ranges in the specification cannot, without more, be imported into the claims as limitations. See Modine Mfg. Co., 75 F.3d at 1551 ("Ordinarily a claim

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<sup>3</sup> The substitute specification does not depart from the original specification when discussing any "thickness" of the semipermeable membrane.

element that is claimed in general descriptive words, when a numerical range appears in the specification and in other claims, is not limited to the numbers in the specification or the other claims.") Here, there is nothing "more" suggesting a particular thickness range. In fact, there is no other mention of a numerical thickness limitation contained in the patent. Rather, the specification only suggests that the semipermeable membrane be "quite thin." Of course, because the applicant has distinguished his semipermeable membrane from the several hundreds of microns thick porous material of Burrough et al., the claim limitation cannot be construed to cover a semipermeable "membrane" that is several hundreds of microns thick. The specification does not show that Edwards disavowed claim scope and limited the thickness of the membrane to a numerical range including "on the order of 25 to 50 microns." From the plain meaning of the term in view of the specification the semipermeable membrane is "thin" and has a thickness less than several hundred microns.

Nothing in the prosecution history changes this interpretation. In responding to a rejection directed at the 0.1 micron limitation in view of Burrough et al., the applicant argued "Burrough et al. make no use whatsoever of any semipermeable membrane." At most, the applicant is asserting that the semipermeable material used in Burrough et al. is not a "membrane." Even interpreting the statement in this light does nothing to suggest that the applicant intended to disclaim membranes that had a thickness other than "on the order of 25 to 50 microns." Rather, the applicant is simply disclaiming calling something several hundreds of microns thick a "membrane."

Thus, we construe "semipermeable membrane" to be a "thin" or "quite thin" layer but with a thickness of less than several hundred microns and allowing the passage of

airborne particles through it while preventing airborne particles larger than a predetermined size, including the size of dust and smoke particles.

*Specularly-Reflective Surface*

Claim 1 includes the limitation that the sample chamber include "an elongated hollow tube . . . having a specularly-reflective surface on its inner walls for transmitting radiation introduced at one end of the tube to the other end of said tube by means of multiple reflections from said specularly-reflective surface." '332 Patent, col. 6, ll. 6-11. The district court construed "specularly-reflective surface" to be "a surface that will transmit radiation down the length of the tube by means of multiple reflections from such surface."

Digital Control argues that this construction is incorrect, asserting that the claim limitation requires a surface with a polished or mirror-like surface finish. Specifically, Digital Control points to optical dictionaries which imply such a limitation and the repeated reference in the specification that the sample chamber acts as a "light pipe." Edwards contends that "specularly-reflective" does not require a mirror-like smoothness on the surface. In fact, Edwards concedes that if "mirror-like" describes the behavior of light incident on the surface, "there may be no quarrel [with the definitions of specularly reflective offered by Digital Control]."

Nothing in the '332 patent's specification suggests the applicant intended the term specularly reflective to have a meaning different from its plain meaning. Indeed, the specification makes no attempt to define the term. The same can be said of the prosecution history. "Specular reflection" is defined as "pertaining to the manner in which light is reflected, as by a mirror or speculum" and a "specular reflector" is "a

reflector that exhibits specular reflectance, producing a direct image of its source." The Photonics Dictionary (2000). Naturally, whether a surface is specularly reflective depends on the type of light that is being reflected. Accordingly, we construe "specularly-reflective surface" to be a surface that reflects light as by a mirror or speculum and note that the district court's construction appears to read the term "specular" out of the phrase "specular reflection."

*Plurality of Apertures Arrayed Along*

Claim 1 requires that the elongated hollow tube include "a plurality of filtering apertures arrayed along [the] tube for improving the diffusion into and out of the space within the tube." '332 Patent, col. 6, ll. 12-14. The district court construed "a plurality of filtering apertures arrayed along [the] tube" to mean "a sample chamber with a minimum of two apertures located somewhere along the surface of the sample chamber." Finding and Recommendation at 15.

Digital Control asserts that this claim construction gives no meaning to the term "arrayed along," thereby giving the '332 patent more breadth than that to which it is entitled. Digital Control also asserts that the applicant argued that a combination of references that "clearly shows" two apertures did not suggest the arrayed apertures limitation. We are not persuaded by these arguments.

We agree with the district court's analysis and adopt its construction of this claim limitation.

B

We now turn to whether under a proper claim construction the district court's grant of summary judgment of noninfringement was nevertheless correct. See Bio-Rad

Labs., Inc. v. Nicolet Instrument Corp. 807 F.2d 964, 969 (Fed Cir. 1986) (explaining that a court of appeals may affirm the judgment of a district court on any ground, including grounds not relied upon by the district court).

#### M301A

The M301A device contains a chamber having only one open end. A chamber is blind bored into a solid aluminum billet, then etched and chromated. The light source is inserted through a hole in the side of the chamber rather than introduced at the open end of the tube. The M301A chamber has four apertures to allow the entry and exit of gas, two of which are located near the side-inserted light source. The M301A uses only two of these apertures, which are covered by a thick "slip-on 80-pores-per-inch sponge filter element." This porous media is approximately 5000 microns thick.

Given our construction of "semipermeable membrane," the M301A cannot literally infringe claim 1, as it does not have a semipermeable membrane having a thickness less than several hundreds of microns. Furthermore, because the applicant of the '332 patent expressly distinguished his invention from devices using porous materials having a thickness greater than several hundreds of microns, he is estopped from asserting such a device infringes under the doctrine of equivalents. See Eagle Comtronics, Inc. v. Arrow Communication, 305 F.3d 1303, 1316 (Fed. Cir. 2002) ('explaining that the doctrine of prosecution history estoppel bars a patentee from asserting as an equivalent subject matter surrendered by argument during prosecution of the patent application). Accordingly, we hold that Digital Control's model M301A cannot infringe claim 1 of the '332 patent under the doctrine of equivalents.

Therefore, we affirm the district court's grant of summary judgment of noninfringement with respect to Digital Control's model 301A.

### *M310*

Two versions of the M310 device are accused of infringement. Both are diffusion chambers having four apertures drilled into the wall of the chamber. Two of the apertures are located at nearly equal distances from the end of the chamber on one side of the chamber with the remaining two located on the opposite side in similar positions. In the first M310 version, one of the apertures is blocked with a plastic plug while the aperture in the other side and at the other end of the tube is covered with a calibration nipple, which allows for the tuning of the monitor at a later date. The two remaining holes are covered with a vent tape manufactured by 3M. In the other version of the M310, the chamber has the calibration nipple but not the plastic plug and the remaining three apertures are covered with the vent tape.

We agree with the district court that the M310 devices contain the "plurality of apertures arrayed along" claim limitation. However, genuine issues of material fact exist as to whether the semipermeable membrane limitation and the specularly-reflective surface limitation are met. With respect to both of these limitations there seems to be a classic "battle of the experts" which renders summary judgment improper.

Edwards's expert, Dr. Kouznetsov, conducted a "modified UL dust test" which suggested that the vent tape in the M310 device effectively prevents unwanted particles the size of dust from entering the sample chamber. Digital Control's expert, Dr. Schaffer, also tested a sample of the vent tape for its permeability of smaller particles. Dr. Schaffer's test included placing a sample of vent tape over the input port of a 0.2

micron filter, drawing a small vacuum through the filter, and placing a sample of standardized zirconia particles (with sizes between 0.2 and 10 microns) on the vent tape. Dr. Schaffer found that about 1/3 of the particles stuck to the tape, 1/3 of the particles stuck to the filter input port, and about 1/3 of the particles passed through to lodge on the 0.2 micron filter, with the size of the particle apparently not influencing whether that particle passed through the vent tape. Based on this, Dr. Schaffer concluded that the vent tape failed to function as a predetermined size filter at all. This demonstrates a genuine issue of material fact as to whether the M310 devices allow the passage of airborne particles through it while preventing airborne particles larger than a predetermined size, such as the size of dust and smoke particles, from entering the chamber. Thus, the question of whether the M310 devices infringe this limitation must be remanded for trial.<sup>4</sup>

The issue of whether the chamber of the M310 devices has a specularly-reflective surface on its inner walls also involves material factual questions. Edward's witness Dr. Kouznetsov performed black paint and gold paint tests to determine whether the Digital Control's chambers produced specular reflection of infrared radiation. He testified that the results of these tests "confirm[ed] that DCS's [Digital Control] chambers utilize specular reflection off the internal walls to conduct the infrared radiation from the source to the detector." Edwards also offered the testimony of Dr. Worek who conducted experiments with visible light which showed the surface of chamber of a M310 device was specular (defined as a surface which would generally

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<sup>4</sup> While apparently not argued by the parties, the vent tape in the M310 would fall within the thickness required by our claim construction, because it is approximately 100 microns.

reflect radiation at the same angle as the incident radiation). Based on the results of these experiments and the wavelength of visible versus infrared light, Dr. Worek concluded that the chamber walls would be even more "specular" with respect to infrared light.

Digital Control's evidence included an experiment conducted by its president, Mr. Mueller, which directed a collimated laser beam through an M310 sample chamber to a small screen about 18 inches away. The collimated laser beam scattered as it made its way through the sample chamber in an M310 device and lit up a large area of the small screen. Mr. Mueller compared this to a collimated laser beam that was reflected off a set of specular reflectors, which resulted in a pin point of light landing on the small screen.

This conflicting evidence demonstrates a classic battle of the experts as to whether the M310 devices have a specularly-reflective surface and thus creates a genuine issue of material fact as to infringement of this limitation. Digital Control's assertions that Kouznetsov's results are flawed and that Worek's test did not observe reflection at the higher glancing angles that would produce multiple reflections in the chambers go to the strength and credibility of the testimony. As such, it is up to the fact-finder to weigh the merit of these arguments. Thus, whether the M310 device meets this limitation must be resolved on remand.

Accordingly, we hold that the district court erred in granting summary judgment of noninfringement with respect to Digital Control's model M310 and remand the case to the district court for trial of this issue.

## III

In its cross appeal, Digital Control asserts that the district court erred in dismissing its counterclaims for invalidity, unenforceability, and non-infringement and in denying its motion for attorney fees. Because we are vacating the district court's underlying grant of summary judgment of non-infringement with respect to the M310 device, Digital Control's counterclaims for invalidity, unenforceability, and non-infringement are no longer moot and must be reinstated. See Liquid Dynamics Corp. v. Vaughan Co., Inc., 335 F.3d 1361, 1370 (Fed. Cir. 2004). Additionally, we vacate the denial of Digital Control's motion for attorney fees in view of our remand for trial.

## IV

In sum, we reverse the district court's claim construction to the extent it conflicts with our construction of the claims as detailed above. We affirm the district court's grant of summary judgment of noninfringement with respect to Digital Control's M301A device. We vacate the district court's grant of summary judgment of noninfringement with respect to Digital Control's M310 device and remand the issue of infringement for trial in view of our claim construction. We also vacate the district court's denial of Digital Control's motion attorney fees and dismissal of Digital Control's counterclaims.

## COSTS

' No Costs.